

## Letters to the Editor: Comment

### Factual Errors in the Eco-indicator 95 – Final Report

Alain Dubreuil

Natural Resources Canada, CANMET, 555 Booth Street, Ottawa, Ontario, Canada K1A 0G1; e-mail: [Dubreuil@nrcan.gc.ca](mailto:Dubreuil@nrcan.gc.ca)

By the end of 2000, the nickel industry will publish their life cycle inventory data from cradle to gate, and it is expected that practitioners will run those data in various life cycle impact assessment models. It is therefore important that the models' parameters be accurate.

Mark Goedkoop (1995) proposed a weighting method for environmental effects that damage ecosystems or impact human health, Eco-indicator 95. As the model is currently widely used, factual errors, especially in regard to nickel toxicity, need to be known to practitioners and the Eco-indicator 95 report needs to be corrected.

It is important to recognize that the improved impact assessment methodology Eco-indicator 99 (Goedkoop et al. 1998, Goedkoop and Spriensma 1999) is using appropriate toxicity data for benzene and nickel.

The characterisation values for several substances given by the Eco-indicator 95 – Final Report are different from the source reference (WHO, 1987). Table 1 compares the weighting factors reported by Eco-indicator 95 and calculated for the primary reference.

**Table 1:** Characterisation values for carcinogenic substances

Substance	Weighting factor for PAH equivalent	
	Eco-indicator 95	WHO (1987)
Benzene	$1.1 \times 10^{-5}$	$4.4 \times 10^{-5}$
Nickel	$4.4 \times 10^{-1}$	$4.4 \times 10^{-3}$
PAH (benzo [a] pyrene)	1	1

The Eco-indicator 95 overestimates the risk associated with emissions of benzene and nickel in the air by up to two orders of magnitude, and the use of incorrect toxicity data by practitioners can lead to unfair treatment of products containing nickel, such as stainless steel.

Similarly, Eco-indicator 95 overestimates the aqueous toxicity of barium by one order of magnitude when compared to the source reference (WHO, 1996) (Table 2).

## Letters to the Editor: Reply

Alain Dubreuil is simply right, and we agree that it is now much better to use the Eco-indicator 99 instead of the 95 version. In the 95 version we made rather crude modelling assumptions.

The errors reported in this letter refer to the original paper publication of the report in 1995. In November 1996 we have corrected these errors and 'published' a new version of the methodology report on our web site ([www.pre.nl](http://www.pre.nl)). It is still available. Also, the 'Manual for designers' report has been corrected and all standard Eco-indicators for commonly used materials and processes have been recalculated. Furthermore, we have contacted all persons who had received a copy of these reports, as far as we could retrieve them. To our knowledge, the most important LCA softwares use the correct version of the method.

Unfortunately, the same situation applies for the Eco-indicator 99 reports. The paper version contains an important calculation error

**Table 2:** Characterisation values for waterborne heavy metals

Substance	Weighting factor for lead equivalent	
	Eco-indicator 95	WHO (1996)
Barium	$1.4 \times 10^1$	$1.4 \times 10^2$
Lead	1	1

Eco-indicator 95 considers that the waterborne heavy metals have an impact on human health and the ecosystem, and improperly uses drinking water quality guidelines in the calculation of the characterisation values. The Guidelines for Drinking Water Quality (WHO, 1996) states: "The recommended guideline values are set at a level to protect the human health; they may not be suitable for the protection of aquatic life."

As a consequence, the drinking water quality guidelines should not be used as environmental guidelines. If the main concern of the Eco-indicator 95 in relation to waterborne heavy metals is for environmental protection, other standards should be used.

The environmental effects of trace metals in the Eco-indicator 99 methodology (Goedkoop et al. 1998, Goedkoop and Spriensma 1999) are estimated without the use of drinking water criteria.

In conclusion, as the Eco-indicator 95 continues to be used, factual errors in the report need to be corrected and practitioners should be aware of the appropriate data. As inventory data for the nickel production will soon be available, there is a strong incentive to rectify the nickel toxicity data.

### References

- Goedkoop M (1995): The Eco-indicator 95 Weighting method for environmental effects that damage ecosystems or human health on a European scale – Contains 100 indicators for important materials and processes – Final Report NOH report 9523 [www.pre.nl](http://www.pre.nl)
- Goedkoop M; Hofsetter P; Müller-Wenk R, Spriensma R (1998): The Eco-Indicator 98, Explained Int. J. LCA 3 (6) 352-360
- Goedkoop M, Spriensma R (1999): The Eco-indicator 99 A damage oriented method for Life Cycle Impact Assessment – Methodology Annex [www.pre.nl](http://www.pre.nl), 108 pp
- WHO (1987): Air Quality Guidelines for Europe, World Health Organization Regional Publications, European Series No. 23, 426 pp
- WHO (1996): Guidelines for Drinking-Water Quality, 2nd ed., Geneva World Health Organization, 973

in the damage factor for CO<sub>2</sub> and some minor other errors that have been corrected in the electronic version on the web. Since April 2000, the Website has the correct version for all reports. Again, we have informed all people who have received the incorrect version of the reports, as far as we could trace them. Unfortunately, the decision has been not to reprint the report, so the Internet version is the only correct version.

Anyone who wants to stay updated on the application and further development of the Eco-indicator reports can join the E-mail discussion group, by sending a blank E-mail to [join-eco-indicator@lists.lyris.net](mailto:join-eco-indicator@lists.lyris.net)

Mark Goedkoop,  
Project leader for the Eco-indicator 95 and 99 projects